

SL1 Mid-Year Final – Paper 1

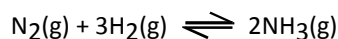
Name _____

1. Which statement is correct for a periodic trend?

- A. Ionization energy increases from Li to Cs.
- B. Melting point increases from Li to Cs.
- C. Ionization energy increases from F to I.
- D. Melting point increases from F to I.

(Total 1 mark)

2. Consider the following reaction.



If the reaction is made to go to completion, what volume of ammonia (in dm^3) can be prepared from 25 dm^3 of nitrogen and 60 dm^3 of hydrogen? All volumes are measured at the same temperature and pressure.

- A. 40
- B. 50
- C. 85
- D. 120

(Total 1 mark)

3. Methane, CH_4 , burns in oxygen gas to form carbon dioxide and water. How many moles of carbon dioxide will be formed from 8.0 g of methane?

- A. 0.25
- B. 0.50
- C. 1.0
- D. 2.0

(Total 1 mark)

4. What amount (in moles) is present in 2.0 g of sodium hydroxide, NaOH ?

- A. 0.050
- B. 0.10
- C. 20
- D. 80

(Total 1 mark)

5. Which statement about electronegativity is correct?

- A. Electronegativity decreases across a period.
- B. Electronegativity increases down a group.
- C. Metals generally have lower electronegativity values than non-metals.
- D. Noble gases have the highest electronegativity values.

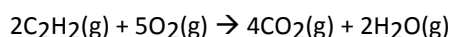
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6. What increases **in equal steps of one** from left to right in the periodic table for the elements lithium to neon?

- A. the number of occupied electron energy levels
- B. the number of neutrons in the most common isotope
- C. the number of electrons in the atom
- D. the atomic mass

(Total 1 mark)

7. Ethyne, C_2H_2 , reacts with oxygen according to the equation below. What volume of oxygen (in dm^3) reacts with 0.40 dm^3 of C_2H_2 ?



- A. 0.40
- B. 0.80
- C. 1.0
- D. 2.0

(Total 1 mark)

8. Which element is a transition metal?

- A. Ca
- B. Cr
- C. Ge
- D. Se

(Total 1 mark)

9. What is the coefficient for $\text{H}_2\text{SO}_4(\text{aq})$ when the following equation is balanced, using the smallest possible integers?



- A. 1
B. 3
C. 4
D. 7

(Total 1 mark)

10. Consider the composition of the species W, X, Y and Z below. Which species is an anion?

Species	Number of protons	Number of neutrons	Number of electrons
W	9	10	10
X	11	12	11
Y	12	12	12
Z	13	14	10

- A. W
B. X
C. Y
D. Z

(Total 1 mark)

11. How many hydrogen atoms are in one mole of ethanol, $\text{C}_2\text{H}_5\text{OH}$?

- A. 1.00×10^{23}
B. 3.61×10^{24}
C. 5.00
D. 6.00

(Total 1 mark)

12. For which element are the group number and the period number the same?

- A. Li
B. Be
C. B
D. Mg

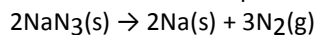
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13. Which equation represents the first ionization energy of fluorine?

- A. $\text{F}(\text{g}) + \text{e}^- \rightarrow \text{F}^-(\text{g})$
B. $\text{F}^-(\text{g}) \rightarrow \text{F}(\text{g}) + \text{e}^-$
C. $\text{F}^+(\text{g}) \rightarrow \text{F}(\text{g}) + \text{e}^-$
D. $\text{F}(\text{g}) \rightarrow \text{F}^+(\text{g}) + \text{e}^-$

(Total 1 mark)

14. Air bags in cars inflate when sodium azide decomposes to form sodium and nitrogen:



Calculate the amount, in moles, of nitrogen gas produced by the decomposition of 2.52 mol of $\text{NaN}_3(\text{s})$.

- A. 1.68
B. 2.52
C. 3.78
D. 7.56

(Total 1 mark)

15. What is the correct sequence for the processes occurring in a mass spectrometer?

- A. vaporization, ionization, acceleration, deflection
B. vaporization, acceleration, ionization, deflection
C. ionization, vaporization, acceleration, deflection
D. ionization, vaporization, deflection, acceleration

(Total 1 mark)

16. Which **two** elements react most vigorously with each other?

- A. chlorine and lithium
B. chlorine and potassium
C. iodine and lithium
D. iodine and potassium

(Total 1 mark)

17. The molar masses of C_2H_6 , CH_3OH and CH_3F are very similar. How do their boiling points compare?

- A. $\text{C}_2\text{H}_6 < \text{CH}_3\text{OH} < \text{CH}_3\text{F}$
- B. $\text{CH}_3\text{F} < \text{CH}_3\text{OH} < \text{C}_2\text{H}_6$
- C. $\text{CH}_3\text{OH} < \text{CH}_3\text{F} < \text{C}_2\text{H}_6$
- D. $\text{C}_2\text{H}_6 < \text{CH}_3\text{F} < \text{CH}_3\text{OH}$

(Total 1 mark)

18. Energy levels for an electron in a hydrogen atom are

- A. evenly spaced.
- B. farther apart near the nucleus.
- C. closer together near the nucleus.
- D. arranged randomly.

(Total 1 mark)

19. Which oxides produce an acidic solution when added to water?

- I. SiO_2
 - II. P_4O_6
 - III. SO_2
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

(Total 1 mark)

20. When the following bond types are listed in decreasing order of strength (strongest first), what is the correct order?

- A. covalent > hydrogen > van der Waals'
- B. covalent > van der Waals' > hydrogen
- C. hydrogen > covalent > van der Waals'
- D. van der Waals' > hydrogen > covalent

(Total 1 mark)

21. Which series is arranged in order of **increasing** radius?

- A. $\text{Ca}^{2+} < \text{Cl}^- < \text{K}^+$
- B. $\text{K}^+ < \text{Ca}^{2+} < \text{Cl}^-$
- C. $\text{Ca}^{2+} < \text{K}^+ < \text{Cl}^-$
- D. $\text{Cl}^- < \text{K}^+ < \text{Ca}^{2+}$

(Total 1 mark)

22. Which is the correct description of polarity in F_2 and HF molecules?

- A. Both molecules contain a polar bond.
- B. Neither molecule contains a polar bond.
- C. Both molecules are polar.
- D. Only one of the molecules is polar.

(Total 1 mark)

23. When Na, K, and Mg are arranged in **increasing** order of atomic radius (smallest first), which order is correct?

- A. Na, K, Mg
- B. Na, Mg, K
- C. K, Mg, Na
- D. Mg, Na, K

(Total 1 mark)

24. What type of solid materials are typically hard, have high melting points and poor electrical conductivities?

- I. Ionic
 - II. Metallic
 - III. Covalent-network
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

(Total 1 mark)

25. How many electrons are there in one ${}^{24}_{12}\text{Mg}^{+2}$ ion?
- A. 10
B. 12
C. 14
D. 22

(Total 1 mark)

26. What are responsible for the high electrical conductivity of metals?
- A. Delocalized positive ions
B. Delocalized valence electrons
C. Delocalized atoms
D. Delocalized negative ions

(Total 1 mark)

27. What is the formula of the compound formed when aluminum reacts with oxygen?
- A. Al_3O_2
B. Al_2O_3
C. AlO_2
D. AlO_3

(Total 1 mark)

28. A certain sample of element Z contains 60% of ${}^{69}\text{Z}$ and 40% of ${}^{71}\text{Z}$. What is the relative atomic mass of element Z in this sample?
- A. 69.2
B. 69.8
C. 70.0
D. 70.2

(Total 1 mark)

29. Which statement is true for most ionic compounds?
- A. They contain elements of similar electronegativity.
B. They conduct electricity in the solid state.
C. They are colored.
D. They have high melting and boiling points.

(Total 1 mark)

30. Which of the following statements are correct?
- I. The melting points decrease from $\text{Li} \rightarrow \text{Cs}$ for the alkali metals.
II. The melting points increase from $\text{F} \rightarrow \text{I}$ for the halogens.
III. The melting points decrease from $\text{Na} \rightarrow \text{Ar}$ for the period 3 elements.
- A. I and II only
B. I and III only
C. II and III only
D. I, II and III

(Total 1 mark)

31. What is the shape of the CO_3^{2-} ion and the approximate O–C–O bond angle?
- A. Linear, 180°
B. Trigonal planar, 90°
C. Trigonal planar, 120°
D. Pyramidal, 109°

(Total 1 mark)

32. When C_2H_4 , C_2H_2 and C_2H_6 are arranged in order of **increasing** C–C bond length, what is the correct order?
- A. C_2H_6 , C_2H_2 , C_2H_4
B. C_2H_4 , C_2H_2 , C_2H_6
C. C_2H_2 , C_2H_4 , C_2H_6
D. C_2H_4 , C_2H_6 , C_2H_2

(Total 1 mark)